

ABSTRACT OF THE DISCLOSURE

Supported reactive catalysts having a controlled coordination structure and methods for their production are disclosed. The supported catalysts of the present invention are useful for the preparation of hydrogen peroxide with high selectivity in addition to other chemical conversion reactions. The supported catalyst comprises catalyst particles having top or outer layer of atoms in which at least a portion of the atoms exhibit a controlled coordination number of 2. The catalyst and methods may be used for the concurrent *in situ* and *ex situ* conversion of organic compounds. In addition, a process is provided for catalytically producing hydrogen peroxide from hydrogen and oxygen feeds by contacting them with the catalysts of the invention and a suitable organic liquid solvent having a Solvent Selection Parameter (SSP) between 0.14×10^{-4} and 5.0×10^{-4} .

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